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INC.

Geoenvironmental Engineering and Technologies

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SUPERINTENDENT

June 17, 1992

Mr. Mike Kuntz  
Washington Department of Ecology  
M/S PV-11  
Olympia, WA 98504-8711

**RE: RESPONSES TO EPA AND ECOLOGY COMMENTS  
ON THE COLBERT LANDFILL PHASE II  
PRELIMINARY GROUNDWATER MONITORING PLAN**

Dear Mr. Kuntz:

Contained herein are responses to Washington State Department of Ecology (Ecology) and U.S. Environmental Protection Agency (EPA) comments on the Colbert Landfill Preliminary Phase II Groundwater Monitoring Plan (Plan) submitted in your April 27, 1992 letter. These responses were prepared by Landau Associates, Inc., Spokane County's engineering consultant for the Colbert Landfill remedial design.

Comments and responses are provided below, and are presented in the same order as presented in your letter.

#### **ECOLOGY COMMENTS**

**Comment No. 1:** The Consent Decree calls for eight monitoring wells to be installed to evaluate the west interception system, but the plan proposes only six be installed. While Ecology and the EPA have no compelling reason to add two wells to the present design, we believe that deleting two wells from the project would not constitute good management nor would it meet the intent of the Consent Decree. We therefore require that two monitoring wells be kept in reserve. The location and schedule for installation of the two reserve wells is at our discretion.

**Response to Comment:** The Plan text will be modified to indicate that two monitoring wells will be retained for construction at a later date (if needed), and at the discretion of EPA and Ecology.

**Comment No. 2:** Two wells, CD-44, CD-45, which are proposed to serve as down gradient wells in order to comply with the Consent Decree are located in a crossgradient location as depicted in Figure 2-3. Please explain in a separate section the rationale for the location of these wells, and how the rationale is consistent with the intent of the Consent Decree.

**Response to Comment:** The second full paragraph on page 2-5 of the text briefly explains the rationale for including Well Locations CD-44, CD-45, and CD-48 in the West Downgradient Monitoring System. The County proposes to modify the text, as follows, to more clearly present the rationale:

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"The SOW specifies that 6 downgradient monitoring locations be utilized for the West Monitoring System. However, this requirement was based on hydrogeologic and contaminant distribution data from the RI that identified a potential downgradient plume width of about 4,300 ft. Subsequent characterization of site conditions performed during Phase I identified a more limited potential downgradient plume width of about 2,300 ft, as shown on Figure 2-3. Thus, the intent of the SOW West Monitoring System (one monitoring location about every 1,000 ft across the potential downgradient plume width) can be accomplished with three monitoring locations (CD-41, CD-42, and CD-43) instead of the six specified in the SOW.

"The three West Monitoring System downgradient monitoring well locations, specified in the SOW but not required for downgradient monitoring, are proposed for construction to the north and south of (crossgradient to) the plume boundaries. Two well locations will be to the north of the plume (CD-44 and CD-45) and one well will be located to the south of the plume (CD-48), as shown on Figure 2-3. Groundwater monitoring at these locations will confirm that the plume is not expanding laterally and, potentially, spreading beyond the limits of the downgradient monitoring system; thus, fulfilling the intent of the SOW to protect downgradient water supplies."

The preceding text will replace the second full paragraph on page 2-5 of the Plan. However, this text does not lend itself to development as a separate section (as requested by Ecology), and the County does not propose to modify the Plan section headings.

**Comment No. 3:** Three wells, CD-42, CD-41, and (proposed) CD-48, which are proposed to serve as monitoring wells upgradient of water supply wells in order to comply with the Consent Decree, are shown in Figure 2-3 to be nearly three thousand feet upgradient of the supply wells. Please explain in a separate section the rationale for these three wells, and how the rationale is consistent with the intent of the Consent Decree.

**Response to Comment:** The SOW requirement for location of monitoring wells upgradient of supply wells was not intended to imply a limited distance between monitoring wells and supply wells. The intent in the SOW is to identify inadequate performance of the interception system well in advance of groundwater from that portion of the aquifer reaching the supply wells. As a result, the closer these wells are located to the leading edge of the plume (outside the zone of capture of the extraction system), the greater the lead time to implement corrective action and prevent degradation of the supply well water source.

The first paragraph on page 2-4 of the Plan will be expanded to clarify this issue. However, a separate section is not needed and is not proposed.

**Comment No. 4:** Please explain the rationale for not putting any monitoring wells southeast of (proposed) Well CD-48. It would appear from Figure 2-3 that if CD-44 and CD-45 are to serve as northern cross gradient wells, then there should be two southern counterpart wells to the southeast of (proposed) CD-48.

**Response to Comment:** Existing Monitoring Well CD-5D and private wells (such as the Wahoo Water District well) are located to the southeast of Well CD-48, as shown on Figure 1-9. Although these wells are not included in the Phase II compliance monitoring system, they will be monitored on a periodic basis and the resulting data can be used to confirm the adequacy of the compliance monitoring system.

No modification to the Plan text is proposed in response to this comment.

**Comment No. 5:** Please either explain in Section 2.1.2 why it is not practicable for the monitoring well system to achieve the technical criteria listed in Section 2.1.2 or reference each section of the report where criteria for the monitoring well system deviates from the technical criteria in Section 2.1.2. In reading through the report it was not clear where criteria deviated from technical criteria.

**Response to Comment:** The two technical criteria not achieved at all locations are:

- Locating downgradient monitoring wells downgradient of the interception system capture zone
- Locating crossgradient monitoring wells outside of the lateral extent of the zone of capture for the interception system.

The first technical criterion is not achieved for Monitoring Wells CD-31A (South System), and CD-44 and CD-45 (West System), because they are located within (or on the edge of) the capture zone for their respective interception systems. However, all constituents of concern are below detection at these locations, and additional protection would not be achieved by selecting new locations downgradient from these existing monitoring locations. Thus, these locations meet the intent of the SOW.

The second technical criterion is not achieved by Monitoring Wells CD-34A and CP-S2 (South System), and (possibly) CD-45 (West System). The intent of the SOW is to locate crossgradient monitoring wells such that the wells can be converted to extraction wells and incorporated into the extraction system, if performance monitoring criteria are exceeded. However, the Upper Sand/Gravel Aquifer saturated thickness is too limited to allow construction of a crossgradient monitoring well that is both outside the zone of capture for the South Interception System and close enough to the outermost extraction well to be effectively used for extension of the interception system (i.e., the spacing between the wells becomes too great to maintain capture between the wells). It is proposed that the crossgradient monitoring wells be properly spaced for incorporation into the South Interception System (if needed), even though they are within the capture zone. If performance criteria are exceeded at these locations, additional monitoring wells will be constructed at the actual capture zone boundary to assess whether the criteria have actually been exceeded and interception system expansion is necessary.

The second technical criterion also may not be met by Monitoring Well CD-45, which is close to the capture zone boundary for the West Interception System (the identification of the capture zone boundary is not exact). However, CD-45 is an existing well location and constituents of concern have not been detected at this location. Selecting a new location farther away from the plume boundary would not be more protective of human health and is not necessary to meet the intent of the SOW.

Section 2.1.2 will be modified to include the preceding explanation.

**Comment No. 6:** Regarding the south system, the next to the last paragraph on page 2-3 states that (proposed) well CP-S2 is to be used as an extraction well and a cross gradient monitoring well. Please explain how this dual purpose well is consistent with the Consent Decree.

**Response to Comment:** The SOW specifies that crossgradient monitoring wells be constructed for conversion to extraction wells (if needed). Thus, CP-S2 fulfills the SOW requirements. When crossgradient monitoring wells are not constructed as extraction wells (such as CD-34A), or if the well provides both downgradient and crossgradient monitoring (such as CD-48), the Plan indicates that an extraction well will be constructed at that location, if needed.

No change to the Plan is proposed in response to this comment.

**Comment No. 7:** In Figure 2-1, (proposed) CP-S2 is shown as being located inside the plume. Locating a compliance monitoring well inside the plume, upgradient and near the pumping wells, may subject the well to increased levels of contamination due to the effects of the pumping wells. As the Consent Decree stipulates that certain actions must be taken depending on measured contamination in compliance monitoring wells, it would seem that the location of CP-S2 carries risk in regard to action.

What action(s) are envisioned if contamination above action levels is observed in CP-S2?

**Response to Comment:** Figure 2-1 shows the South Interception System capture zone, not the plume boundary. Figure 1-8 shows the plume boundary for the Upper Aquifers and, although CP-S2 is not shown on this figure, it is apparent that CP-S2 is outside the plume boundary (as defined by exceedance of the Performance Standards).

As discussed in response to Comment No. 5, there are technical considerations that make it impracticable to meet all SOW and technical criteria for crossgradient monitoring wells. Thus, criteria exceedances at CP-S1 (or CD-34A) would require additional assessment to determine if SOW crossgradient monitoring criteria have actually been exceeded. Additional assessment would be implemented with the review and concurrence of EPA and Ecology. Because this approach is conservative (i.e., a false positive is much more likely than a false negative), it meets the intent of the SOW.

No change to the Plan is proposed in response to this comment.

**Comment No. 8:** Please explain Figure 2-2 and Figure 2-3, and highlight in the text the reason(s) for the different configuration of contours in figures.

**Response to Comment:** The primary differences between Figures 2-2 and 2-3 are: 1) Figure 2-2 shows model-generated groundwater elevation contours under pumping conditions and Figure 2-3 shows measured groundwater elevation contours under nonpumping conditions; and 2) Figure 2-2 represents the capture zone as the shaded area and Figure 2-3 represents the areal extent of the Constituents of Concern as the shaded area. The capture zone represented on Figure 2-2 is only applicable under pumping conditions (thus, the use of the model-generated groundwater contours). The concepts represented in Figure 2-3 (crossgradient and downgradient areas) could be shown using either pumping or nonpumping groundwater contours (the relationships do not change appreciably). To eliminate the confusion this apparently creates, Figure 2-3 will be modified to show the same groundwater elevation contours as shown on Figure 2-2. No other changes are proposed in response to this comment.

**Comment No. 9:** Why is the design of the compliance monitoring system for the pumping system (i.e., cross gradient and downgradient monitoring wells) based on a non-pumping scenario in Figure 2-3 rather than a pumping scenario in 2-2?

**Response to Comment:** Both pumping and nonpumping condition were considered during design of the monitoring system. Although the pumping system modifies the flow regime, it does not change the direction of flow on a regional scale, and the compliance monitoring system can fulfill its function during remediation and during postremediation monitoring. The confusion created by representing the monitoring system on a figure with nonpumping groundwater elevation contours (Figure 2-3) will be remedied in the Final Plan, as described in the response to Comment No. 8. No other modification to the Plan is proposed in response to this comment.

**Comment No. 10:** Has any consideration been given to the pumping scenario of Figure 2-2 in designing the monitoring system?

**Response to Comment:** As described in the responses to the previous two comments, the monitoring system design is based on both pumping and nonpumping conditions. No modification to the Plan is proposed in response to this comment.

**Comment No. 11:** If the pumping system deflects the groundwater flow paths such that the compliance monitoring system is not deemed to be adequate by the governments, then the governments will require the installation of additional monitoring wells. Wells required to meet inadequacies will not be considered reserve wells noted in Comment No. 1.

**Response to Comment:** It is unclear whether this comment represents a specific concern or is a general statement. The Consent Decree SOW specifies that certain monitoring requirements be met by the County, and this Plan addresses those requirements. If the aquifer(s) do not respond to pumping as anticipated, such that the monitoring system does not meet the SOW requirements, the governments have the authority to require system modifications. However, the County retains the right to limit the scope of the monitoring system to that required by the

SOW, and will not install additional monitoring wells (beyond the two being held in reserve by the governments) unless the governments demonstrate that the monitoring system is inadequate. No change to the Plan is proposed in response to this comment.

**Comment No. 12:** Although the text describes an east extraction system, the east system is not shown in any of the figures. Please show east extraction system in a figure, and refer to the figure in the text.

**Response to Comment:** The East Extraction System will be shown on Figure 1-3, which is referenced in the text on page 1-4.

**Comment No. 13** (Ecology Comment 4 on the Preliminary Phase II Extraction Well Plan): In the second paragraph of page 2-4, the "hydrogeological conditions" that necessitate two additional monitoring wells at Monitoring Location CD-44 should be identified.

**Response to Comment:** Existing Well CD-44C2 is screened near the center of the Lower Sand/Gravel Aquifer, and the lower portion of the Aquifer is somewhat stratified. As a result, additional monitoring wells are needed above and below the existing well to provide adequate vertical monitoring at this location.

The Plan text will be revised to clarify these conditions.

**Comment No. 14** (Ecology Comment 5 on the Preliminary Phase II Extraction Well Plan): In the first paragraph on page 2-5, the implication is made that any new monitoring wells outside the zone of capture are to be installed at the discretion of the County. Ecology and EPA's role in deciding the location of new monitoring wells should be made clear.

**Response to Comment:** Text will be added to the end of the paragraph indicating that new monitoring well locations (if any) will be selected with the review and concurrence of Ecology and EPA.

## **EPA COMMENTS**

**Comment No. 1:** Page 1-5, Section 1.2.2—Fluvial Unit is stated as being treated as an independent hydrogeologic unit for the project, but then is combined into Upper Aquifer in constituent distribution (page 1-7).

**Response to Comment:** The Fluvial Aquifer receives recharge from the Upper Sand/Gravel Aquifer which appears to be the source of constituents of concern present in the Fluvial Aquifer. However, a strong upward vertical gradient from the Lower Sand/Gravel Aquifer to the Fluvial Aquifer inhibits migration of constituents of concern from the Fluvial Aquifer (to the Lower Sand/Gravel Aquifer), and is the primary basis for treating these units as independent aquifers. The text will be revised to indicate that the Fluvial Unit receives recharge from the Upper Sand/Gravel Unit and is combined with this unit (as the Upper Aquifers) for the purpose of

characterizing constituent distribution. The basis for treating the Fluvial Aquifer and Sand/Gravel Aquifer as separate hydrogeologic units will also be clarified.

**Comment No. 2:** Page 2-1, Section 2.1.1—Although monitoring in east extraction system is not required, a considerable amount of information may be obtained from periodic monitoring.

**Response to Comment:** The County concurs and will monitor groundwater in this area as part of the domestic well monitoring program and through discretionary monitoring of existing monitoring wells. However, this monitoring is not part of the compliance monitoring system and, as a result, is not addressed in the Plan. No modification to the Plan is proposed in response to this comment.

**Comment No. 3:** Page 3-2, Section 3.1—As previously recommended in Phase I monitoring well installation comments, the casing used for sealing the aquitard after step-down should be left in place to provide additional protection between aquifer units.

**Response to Comment:** It is anticipated that threaded temporary steel casing will be utilized instead of welded steel casing for monitoring well construction, and the cost of this casing precludes leaving it in the ground. Also, leaving the temporary casing in the ground creates a potential migration path along the outside of the casing, which could be less protective than a properly installed bentonite seal with the temporary casing removed. The proposed construction methods described in the Plan were used to construct about 30 monitoring wells during Phase I, and were demonstrated to be effective. No change to the Plan is proposed in response to this comment.

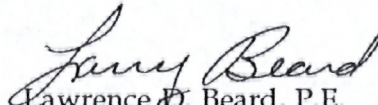
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It is stated in your comments letter that the Plan is adequate. Spokane County interprets this as approval to proceed with construction of the Phase II groundwater monitoring wells, and intends to initiate well construction by July 1992. If this interpretation is incorrect, please inform Spokane County by June 26, 1992, so that mobilization for well construction can be terminated.

If you have any questions about the responses to Ecology or EPA Plan comments, please call Dean Fowler (Spokane County) or myself. If not contacted by June 26, 1992, Spokane County will assume the responses to comments presented herein are adequate and the Plan will be finalized.

LANDAU ASSOCIATES, INC.

By:

  
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cc: Dean Fowler, Spokane County  
Neil Thompson, U.S. Environmental Protection Agency  
Lyle Diedieker, Ecology & Environment, Inc.